

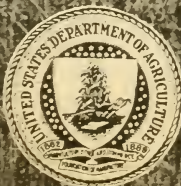
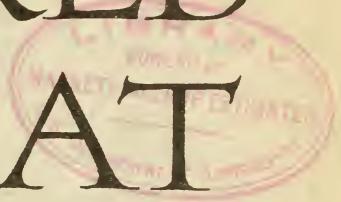
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UNITED STATES DEPARTMENT OF AGRICULTURE
DEPARTMENT CIRCULAR 194

KANRED WHEAT



KANRED WHEAT is a pure-line selection from Crimean, one of the hard red winter wheats of the Turkey type imported from southern Russia and grown on large acreages in Kansas and other hard winter-wheat States. The Kanred was developed at the Kansas Agricultural Experiment Station and has been grown commercially during the past five years.

Kanred wheat is resistant to the forms of leaf rust and stem rust which occur in the hard red winter-wheat district. It ripens slightly earlier than Turkey and Kharkof and is more winter resistant. It outyields these varieties in Kansas, having averaged about 4 bushels more than either during the past 10 years.

In milling and baking experiments conducted independently by the United States Department of Agriculture and the Kansas station, the Kanred gave results similar to those obtained with other hard red winter wheats.

It is estimated that about 2,000,000 acres of this new variety were grown in 1921.

Kanred wheat is recommended for the hard red winter-wheat belt, particularly Kansas and Nebraska.

Contribution from the Bureau of Plant Industry

WM. A. TAYLOR, Chief

Washington, D. C

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KANRED WHEAT.

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WHAT IS KANRED WHEAT?

The variety of wheat called Kanred (a contraction of Kansas Red) is a selected strain of Crimean (Turkey) hard red winter wheat developed at the Kansas Agricultural Experiment Station.

HISTORY.

Kanred wheat is the product of a single head selected from the Crimean variety (S. P. I. No. 6015; C. I. No. 1435) which had been introduced into the United States from Russia in 1900 by the United States Department of Agriculture. The selection from which it descended was one of 554 head selections made in 1906 by Prof. H. F. Roberts, of the botany department of the Kansas Agricultural Experiment Station. In 1910 a large number of these pure strains were turned over to the agronomy department of the Kansas station for testing, and in 1911 the most promising, including Kanred, were grown in field plats. From the plats more accurate records of yields were obtained than had been possible from the nursery rows. During the years of preliminary testing Kanred was known as No. P-762. Several of the selections, including No. P-762, were grown in 1914 in experiments at the Hays Branch Experiment Station and in cooperative tests with farmers in several parts of the State and in 1915 in experiments at the Colby, Garden City, and Tribune substations in Kansas. In many of these trials No. P-762 showed unusual promise. In 1916, its rust resistance was discovered and about the same time its greater winter hardiness. It was named Kanred at the time it was widely distributed by the Kansas Agricultural Experiment Station in the fall of 1917. In 1918 about 300

Kansas farmers grew the new variety. In 1919 nearly 1,500 farmers grew it. In 1920 it was estimated that fully 500,000 acres were sown in Kanred wheat, and in 1921 probably 2,000,000 acres of it were harvested.

DESCRIPTION.

Kanred is a hard red winter wheat. It is bearded and has hairless white chaff, or glumes. In appearance it closely resembles the Turkey and Kharkof varieties, but it can usually be distinguished from them by the longer beaks (beards) on its outer glumes. The beaks of Kanred wheat vary from one-eighth of an inch to an inch in length (fig. 1), while those of the Turkey and Kharkof varieties usually vary only from one-sixteenth to three-eighths of an inch in length (fig. 2). The Kanred is similar to the Turkey and Kharkof varieties in all other respects, except that it is slightly earlier, slightly more winter resistant, and is remarkably resistant to leaf rust and to some forms of black stem rust. These characteristics have been factors in causing it to outyield Turkey and Kharkof in most sections of Kansas and other hard winter-wheat States.

EARLINESS.

Kanred wheat usually ripens from one to four days earlier than the Turkey or Kharkof varieties. In some seasons or in some localities there is little or no difference in the date of maturity. At Manhattan Kans., the average date of ripening for a period of 10 years has been about two days earlier than that of Turkey or Kharkof. This difference, though small, has sometimes given Kanred an advantage over other varieties in escaping or being less severely injured by hot winds, drought, and hail and is one factor in its higher yield.

RESISTANCE TO WINTERKILLING

Experiments have shown that in most cases the Kanred variety is more resistant to winterkilling than the Turkey or Kharkof wheats. There is some loss from winterkilling in the hard winter-wheat sections of the United States nearly every year, the loss increasing northward until it becomes impossible to grow winter wheat. The superior yields of the Kanred variety in northern and northwestern Kansas, eastern Colorado, southeastern Wyoming, and in Nebraska and South Dakota appear to have been due in considerable measure to this factor. On the other hand, Kanred wheat has not produced higher yields in northeastern Wyoming nor in Montana, North Dakota, and Minnesota, where winterkilling usually is most severe. This failure to outyield other winter varieties in these States is not due to less winter hardiness under the conditions that prevail there, but apparently to other conditions more favorable to the Kharkof and Turkey wheats.

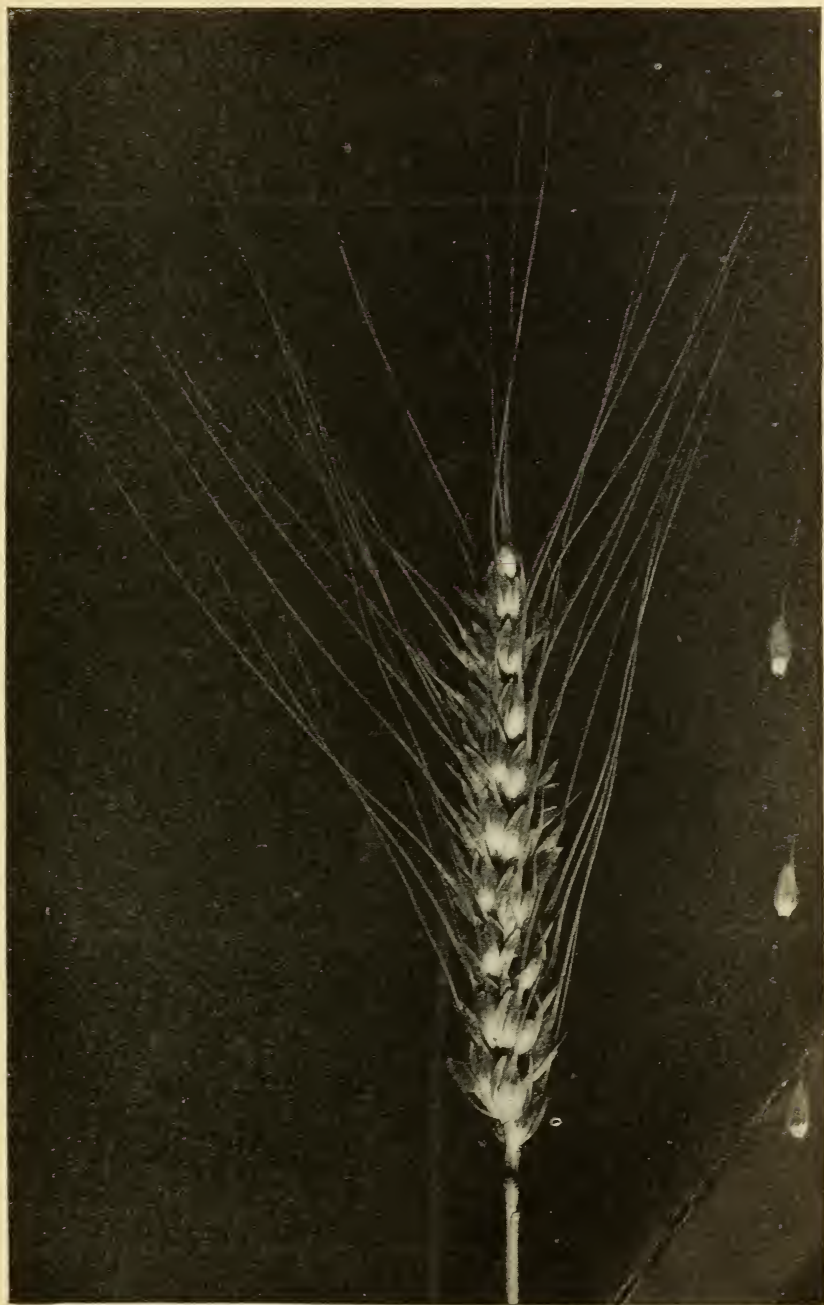


FIG. 1.—Head of Kanred wheat and three glumes, showing the approximate beak length at the base, center, and tip of the spike.

RESISTANCE TO RUST.

Kanred wheat is resistant to the forms of orange leaf rust (*Puccinia triticina*) and of black stem rust (*Puccinia graminis*) that predominate in the hard winter-wheat belt. This difference was especially noticeable in 1919, a bad rust year. This variety has not proved resistant

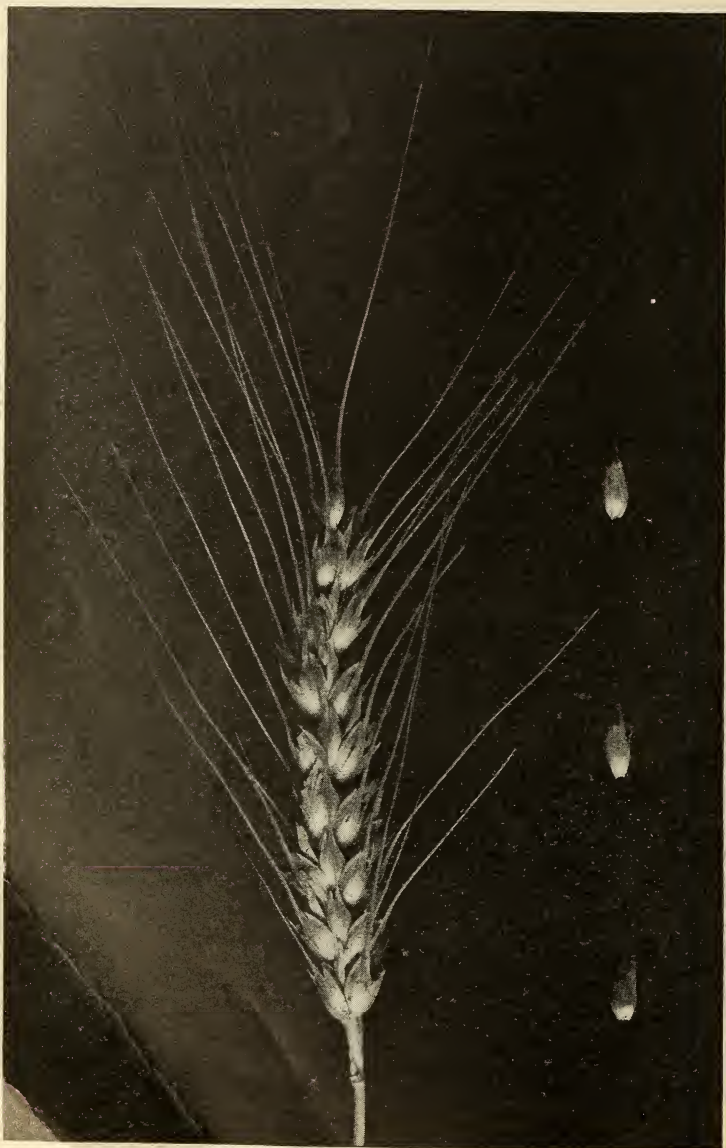


FIG. 2.—Head of Turkey wheat and three glumes, showing the approximate beak length at the base, center, and tip of the spike.

to all of the forms of leaf rust and stem rust present in Minnesota, North Dakota, and South Dakota, although, as noted above, it is very resistant to the common forms found in the principal portions of the hard winter-wheat belt.

As rust causes considerable damage to winter wheat in this section, the resistance of the Kanred variety to the common forms of both rusts without doubt is partly responsible for its higher yields.

YIELDS OF KANRED WHEAT.

Kanred wheat has been grown in varietal experiments at Manhattan, Kans., since 1911 and at the branch experiment stations in Kansas since 1914 and 1915. Since 1917 it has been included in experiments in several other States. Table I compares the yields of the Kanred, Kharkof, and Turkey varieties grown under the same conditions at 18 agricultural experiment stations in the western half of the United States. Several different strains of Kharkof and Turkey wheat were used in the experiments.

Strains are partly indicated by C. I. numbers, which are accession numbers of the Office of Cereal Investigations of the Bureau of Plant Industry. All the strains are very similar, and most of them are identical. Even the Kharkof and Turkey varieties can not be distinguished, and are identical except that the Kharkof is believed to be slightly more winter hardy than the Turkey and usually gives a little higher yield.¹

In addition to the yields obtained from agricultural experiment stations, Kanred wheat has been grown in 276 tests by farmers throughout the hard winter-wheat section of Kansas during the seven years from 1914 to 1920, inclusive. A summary of the more important results is given in Table II.² In these tests Kanred usually was compared with Turkey, Kharkof, and the local variety grown by the individual farmers. The State was divided into northeast, southeast, central, and western sections. In the northeast and southeast sections the local variety often was a variety of soft red winter wheat. In these sections the Harvest Queen and Fultz varieties are most commonly grown.

¹Most of the data on yields presented in Table I were obtained from cooperative experiments of the Office of Cereal Investigations and from experiments by the Kansas Agricultural Experiment Station. Those from North Platte, Nebr., and Pullman, Wash., were obtained by the Nebraska and Washington Agricultural Experiment Stations, respectively, which kindly permit their use here.

²The yield data summarized in Table II were obtained by the agronomy department of the Kansas Agricultural Experiment Station in cooperation with farmers.

TABLE I.—Annual and average yields obtained from Kanred, Kharkof, and Turkey wheats grown at 18 agricultural experiment stations in the western half of the United States during periods of varying length in the 10-year period from 1911 to 1920, inclusive.

Station and variety	C. I. No.	Yield per acre.										Average for years grown.
		1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	
Manhattan, Kans.:		<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>
Kanred.....	5146	34.6	19.8	37.1	35.2	25.0	33.6	16.6	21.7	20.7	31.3	27.7
Kharkof.....	6206	26.1	11.9	33.8	36.0	22.9	24.6	14.6	16.9	22.9	29.1	23.9
Turkey.....	1558	31.1	13.2	33.6	36.1	23.0	22.2	12.7	16.3	20.7	29.4	23.8
Hays, Kans.:												
Kanred.....	5146				25.6	(^a)	36.4	20.9	10.8	12.6	34.9	23.5
Kharkof.....	1442				23.0		34.5	20.2	13.7	6.8	26.0	20.7
Turkey.....	1571				21.2		33.9	19.2	10.1	8.2	25.8	19.7
Garden City, Kans.:												
Kanred.....					15.4	17.2	0	0	26.9	0		9.9
Kharkof.....					15.5	13.3	0	0	24.3	0		8.9
Turkey.....					13.8	15.3	0	0	23.6	0		8.8
Colby, Kans.:												
Kanred.....					34.3	42.6	0	14.3	40.1	28.8		26.7
Turkey.....					33.8	28.8	0	9.3	28.8	11.3		18.7
Tribune, Kans.:												
Kanred.....					8.0	0	0	0	12.1	0		3.4
Kharkof.....					10.0	0	0	0	9.0	0		3.2
Turkey.....					2.0	0	0	0	9.2	0		1.9
Amarillo, Tex.:												
Kanred.....	5146						13.7	0	20.0	(^b)		11.2
Kharkof.....	2208						11.2	0	12.8			8.0
Turkey.....	1558						12.3	0	18.0			10.1
Akron, Colo.:												
Kanred.....	5146						17.6	20.0	21.3	30.1		22.3
Kharkof.....	1583						16.9	12.3	17.6	16.2		15.8
Turkey.....	1571						8.5	18.4		21.7		
North Platte, Nebr.:												
Kanred.....							11.0	20.0	40.3			23.8
Kharkof.....							13.3	17.2	36.5			22.3
Turkey.....							12.8	16.7	33.0			20.8
Archer, Wyo.:												
Kanred.....	5146							29.7	7.5	21.0		19.4
Kharkof.....	1442							31.6	6.5	15.1		17.7
Turkey.....	1571							28.4	6.3	12.0		15.6
Sheridan, Wyo.:												
Kanred.....	5146							43.3	11.9	32.0		29.1
Kharkof.....	1442							44.4	17.2	38.7		33.4
Turkey.....	1571							42.8	11.4	34.7		29.6
Highmore, S. Dak.:												
Kanred.....	5146							27.1	27.8	0		18.3
Kharkof.....	1442							20.0	21.7	0		13.9
Turkey.....	3689							17.5	23.5	0		13.3
Brookings, S. Dak.:												
Kanred.....	5146								22.9	23.3		23.1
Kharkof.....	1442								12.5	6.7		9.6
Turkey.....	3689								18.0	25.0		21.5
Dickinson, N. Dak.:												
Kanred.....	5146							12.0	0	4.2	0	4.1
Kharkof.....	1583							16.4	0	2.9	0	4.8
Turkey.....	1571							11.8	0	3.7	0	3.9
Moccasin, Mont.:												
Kanred.....	5146							1.3	22.5	5.3	20.0	12.3
Kharkof.....	1583							0	25.4	5.3	20.5	12.8
Turkey.....	1558							0	18.3	5.5	22.0	11.5
Pullman, Wash.:												
Kanred.....								31.8	55.1	50.5		45.8
Turkey.....								30.5	59.5	52.3		47.4
Lind, Wash.:												
Kanred.....	5146								6.5	15.5	9.6	10.5
Kharkof.....	1442								7.3	13.9	7.9	9.7
Turkey.....	6175								7.6	14.7	7.1	9.8
Moro, Oreg.:												
Kanred.....	5146							20.8	24.1	38.4	32.7	29.0
Kharkof.....	1442-12							19.0	26.2	40.0	33.2	29.6
Turkey.....	1571							23.6	25.4	41.5	32.5	30.8
Burns, Oreg.: ^c												
Kanred.....	5146								4.5	20.0	30.8	18.4
Kharkof.....	1442								4.7	21.3	34.9	20.3
Turkey.....	1558								3.0	18.6	38.0	19.5

^a Crop destroyed by hail.^b Experiments discontinued.^c Grown under irrigation.

TABLE II.—Summary of yields of Kanred, Kharkof, Turkey, and a local variety of wheat grown in 204 cooperative tests with farmers in Kansas during the 7-year period from 1914 to 1920, inclusive.

Section of the State and year.	Number of tests.	Yield per acre.			
		Kanred.	Kharkof.	Turkey.	Local variety.
		<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
Northeast:					
1914.....	1	34.4	24.3	25.2	.....
1915.....	4	14.1	15.2	15.7	16.8
1916.....	3	34.5	.....	19.2	24.9
1917.....	2	27.6	.....	23.0	21.0
1918.....	22	35.7	.....	23.8	30.9
1919.....	14	26.6	23.7	22.6	23.5
1920.....	9	28.1	.....	26.8	.....
Average.....		28.7	.....	23.2	.....
Southeast:					
1915.....	4	9.9	.....	.....	12.9
1919.....	1	14.7	.....	.....	28.3
1920.....	1	33.2	.....	.....	27.1
Average.....		19.3	.....	.....	22.9
Central:					
1914.....	12	28.5	27.5	.....	26.1
1915.....	23	24.7	20.4	.....	21.2
1916.....	25	26.6	18.5	.....	19.6
1917.....	14	28.4	21.0	.....	21.0
1918.....	23	22.6	17.8	.....	18.8
1919.....	21	21.8	19.3	.....	18.7
1920.....	20	19.7	17.8	.....	18.5
Average.....		24.6	20.3	.....	20.5
Western, 1917.....	1	6.2	5.7	.....	.....

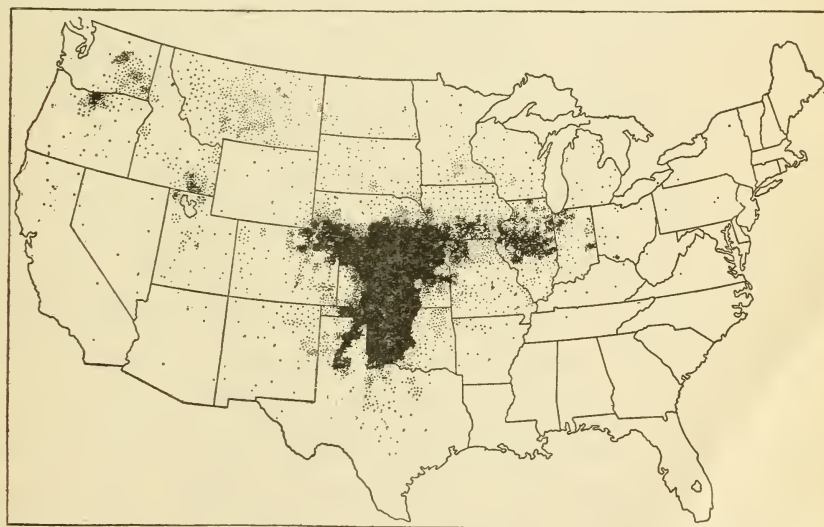


FIG. 3.—Outline map of the United States, showing the distribution of hard red winter wheat (Turkey, Kharkof, and Crimean) in 1919. Each dot represents 1,000 acres or less.

WHERE ADAPTED.

Briefly, Kanred wheat may be grown with success wherever other hard winter wheats are grown. It should partly replace the Turkey and Kharkof varieties now widely grown. The distribution of these varieties in 1919 is shown in figure 3.

The yields recorded in Tables I and II show that the Kanred variety is unusually well adapted to many of the varying conditions in the State of Kansas. In the northeastern section of the State where it was developed, it has shown to good advantage. At Manhattan, during the 10-year period from 1911 to 1920 it has outyielded the Kharkof and Turkey wheats by nearly 4 bushels per acre. On the farms in this section it has yielded even better, outyielding the Turkey variety on the average by 5.5 bushels per acre.

In central Kansas, Kanred wheat has shown to only slightly less advantage. At the Hays station in Ellis County it has outyielded the Kharkof by nearly 4 bushels and the Turkey wheat by nearly 5 bushels during a 6-year period. On the farms in that section the average difference in favor of Kanred is about 4 bushels.

In northwestern Kansas, eastern Colorado, southeastern Wyoming and southwestern Nebraska Kanred wheat has proved considerably better than the Turkey or the Kharkof varieties. At Colby, Kans., the average yield of Kanred wheat for the 6-year period, 1915 to 1920, exceeds that of Turkey by 8 bushels per acre. During the past four years at Akron, Colo., the Kanred has outyielded the Kharkof variety by 6.5 bushels per acre. In the 3-year period from 1918 to 1920, inclusive, the Kanred on the average has yielded from 1.5 to 4 bushels more than the Kharkof or Turkey at Archer, Wyo., and North Platte, Nebr. Northward the differences in yield apparently decrease. The experimental results in this district indicate that the rust resistance, slightly greater winter hardiness, and earlier maturity of the Kanred combine to make its yields in most cases significantly larger than those obtained from the Kharkof or Turkey varieties.

In the eastern parts of Nebraska and South Dakota, in southern Minnesota and Iowa, northern Missouri, and central Illinois, the Kanred wheat will yield as well as the Turkey or Kharkof and often should outyield them because of its rust resistance and greater winter hardiness. In experiments at Brookings and Highmore, S. Dak., in 1919, a year of severe rust infection, the Kanred variety nearly doubled the yields of the Kharkof and Turkey wheat.

On the drier portion of the southern Great Plains, the Kanred may be expected to yield somewhat better than other varieties of hard winter wheat because of its slightly earlier maturity. The advantage, however, as shown by experiments at Amarillo, Tex., and Garden City and Tribune, Kans., is not as great as in the sections previously mentioned where winterkilling and rust often are detrimental factors.

WHERE NOT ADAPTED.

In the northern Great Plains and in the Pacific Northwest, where considerable hard winter wheat is grown, the Kanred variety has not yielded materially better than the Turkey or Kharkof wheat. In these sections rust seldom occurs, and the rust resistance of Kanred

wheat, therefore, is of little or no advantage. In experiments conducted at Sheridan, Wyo., and Moccasin, Mont., in the northern Great Plains, and at Moro and Burns, Oreg., and Pullman, Wash., in the Pacific Northwest, the earlier maturity and greater winter hardiness of Kanred wheat have not been sufficient to cause a difference in yield. Only in experiments at Lind, Wash., in this district, has the Kanred slightly outyielded the Turkey and Kharkof varieties.

Kanred can not compete with the soft winter-wheat varieties grown on the lower lands or richer soil of eastern Kansas or in the eastern United States. Farm tests in southeastern Kansas show a decided advantage for the soft wheats. The same is shown in many experiments in States farther east.

Kanred is not winter hardy enough to replace spring wheat in the northern Great Plains. Experiments at Dickinson, N. Dak., show that it can not be successfully grown in that section of North Dakota. It also can not be successfully grown in much of South Dakota and Minnesota.

SUMMARY OF YIELDS.

To summarize briefly, it may be said that wherever Turkey or Kharkof hard winter wheats are grown the Kanred can be grown with equal chances of success. Except in Washington, Oregon, Idaho, Montana, and northern Wyoming it may be expected to produce higher yields than the other hard winter wheats commonly grown.

MILLING AND BAKING VALUE.

Some concern has recently been expressed in commercial circles³ regarding the milling quality of Kanred wheat in comparison with the old standard varieties. The Kansas Agricultural Experiment Station,⁴ which had conducted milling and baking experiments with samples of Kanred, Kharkof, or Turkey wheat grown at Manhattan, Kans., each year since 1912, made available the results of its experiments. The data from these experiments, as published in the Operative Miller, are summarized in Table III.

Since 1917 samples of Kanred wheat have been milled also and baked in the experimental mill of the United States Department of Agriculture. In all, 25 samples of the Kanred variety have been milled there, representing the four crop years, 1917 to 1920, inclusive. Of these samples, 17 may be compared directly with samples of either Turkey or Kharkof wheat. These samples were all grown under similar conditions, obtained from agricultural experiment stations in the hard winter-wheat sections of Kansas, Texas, Colorado, Nebraska, South Dakota, North Dakota, Wyoming, Montana,

³ Sterling, R. E. Is Kanred a superwheat? *In* Northwestern Miller, v. 123, no. 4, p. 442. 1920.

⁴ Fitz, L. A. Kanred—the new Kansas wheat. *In* Operative Miller, v. 25, no. 9, p. 284-285. 1920.

Washington, and Oregon. Data from these experiments are shown in Table IV.

TABLE III.—*Summary of milling and baking data with samples of Kanred, Kharkof, and Turkey wheats grown at Manhattan, Kans., during the 8-year period from 1912 to 1919, inclusive.*

[Experiments conducted by the milling department of the Kansas Agricultural Experiment Station.]

Descriptive data.	Turkey. ^a	Kharkof.	Kanred.
Number of samples.....	7	8	8
Bushel weight, mill cleaned.....pounds..	57.8	57.4	58.3
Crude protein in the wheat.....per cent..	14.4	14.0	15.2
Crude protein in the flour.....do.....	12.5	12.4	13.3
Dry gluten.....do.....	14.2	14.0	15.0
Yield of flour.....do.....	64.6	63.3	64.9
Yield of feed.....do.....	35.3	36.4	34.7
Water absorption of flour.....do.....	59.9	60.2	59.8
Time of fermentation.....minutes.....	200	188	193
Maximum expansion.....cubic centimeters..	2,135	2,162	2,219
Volume of loaf.....do.....	1,945	1,911	1,919
Color of loaf.....per cent.....	92.0	94.0	92.6
Texture of loaf.....do.....	94.0	94.0	94.0

^a A sample of Turkey wheat from the 1912 crop was not milled.

In these two separate experiments, independently conducted, the Kanred had a heavier bushel weight and produced a larger percentage of flour and less feed than the Turkey or Kharkof varieties. In the Kansas experiments there was a greater percentage of crude protein in both the wheat and flour of the Kanred variety than in either Kharkof or Turkey wheat, while in the experiments of the United States Department of Agriculture the protein content was slightly less. In both experiments Kanred wheat showed a slightly lower average water absorption.

TABLE IV.—*Summary of milling and baking data from 25 samples of Kanred wheat and from 17 of these Kanred samples and 17 comparable samples of the Turkey or Kharkof variety grown in the 4-year period from 1917 to 1920, inclusive.*

[Experiments conducted by the milling division of the Bureau of Markets, United States Department of Agriculture.]

Descriptive data.	All Kanred samples.	Comparable samples.	
		Kanred.	Turkey or Kharkof.
Number of samples.....	25	17	17
Bushel weight:			
Dockage free.....pounds..	58.2	58.4	57.9
Mill cleaned.....do.....	58.6	58.8	58.3
Crude protein content of wheat (N×5.7, basis 13.5 per cent moisture content).....per cent..	14.0	14.7	15.1
Yield of straight flour.....do.....	73.9	74.3	72.5
Yield of shorts.....do.....	13.4	13.1	14.3
Yield of bran.....do.....	13.9	13.7	14.3
Water absorption of flour.....do.....	61.9	61.9	63.1
Volume of loaf (340 grams of flour used).....cubic centimeters..	2,020	1,984	2,027
Weight of loaf.....grams.....	508	506	510
Texture of loaf.....per cent.....	90.0	90.2	90.6
Color of loaf.....do.....	90.3	90.4	90.8

In the Kansas experiments the Kanred had a greater maximum expansion than either the Kharkof or Turkey wheat, and a greater

average loaf volume than the Kharkof, but slightly less than the Turkey variety. In the experiments by the United States Department of Agriculture, Kanred wheat showed a slightly lower average loaf volume than Turkey or Kharkof wheat. This can be attributed partly to the heavier bushel weight of Kanred wheat, for on the average in hard red winter wheat the greater the bushel weight the smaller is the loaf volume. In weight, color, and texture of loaf the results of both experiments average slightly lower for Kanred wheat, except that the Kansas results show equal texture. The differences in all baking factors are so small that they can not be considered significant. In both milling experiments, however, the yields of flour from Kanred samples consistently exceeded those from comparable samples of Kharkof or Turkey wheat.

In these experiments the results from the Kanred wheat do not compare unfavorably with those from the Kharkof and Turkey varieties. Other and more extensive experiments are in progress. The data so far obtained indicate that the quality of hard red winter wheat will be maintained, with a widespread distribution of Kanred wheat throughout the hard winter-wheat section.

ESTABLISHING THE VARIETY.

The Kanred is so similar to the Turkey and Kharkof varieties that unusual care in obtaining seed is necessary. Ordinary hard winter wheat and impure Kanred frequently have been sold and represented as pure Kanred seed. For these reasons the Office of Cereal Investigations of the Bureau of Plant Industry, United States Department of Agriculture, and the Kansas Agricultural Experiment Station cooperated in inspecting fields of Kanred wheat grown in 1918. The grain from all pure and clean fields was certified as salable for seed purposes. The certification has been continued each year by the Kansas Crop-Improvement Association with the cooperation of the Kansas Agricultural Experiment Station. The association each fall publishes lists giving the names and addresses of growers and the quantity of seed offered for sale. Every precaution is taken to insure pure seed true to name. No fields are certified which grew another variety of wheat the preceding year or which were sown with impure or uninspected seed. In this way it is expected that a supply of seed of unquestioned purity will be maintained.

More than 20 million acres of hard red winter wheat are grown annually. The Kanred wheat is better adapted than the Turkey or Kharkof, the commonly grown varieties, to more than half of this acreage and could replace them with profit to the growers in the sections where adapted.

How To Do It

DO YOU WANT practical suggestions on how to build a silo, a hog house, a poultry house, a potato-storage house, or how to make a fireless cooker or other farm home convenience, a flytrap, or a self-feeder for hogs? Are you seeking ideas on how to prepare vegetables for the table, how to care for food in the home, how to bake bread and cake and other appetizing foods in an efficient and economical manner? Is there some practical question about your corn or wheat or cotton or other crops, or about your poultry or live stock, to which you are seeking an answer? The answers to thousands of such questions, with practical suggestions for doing thousands of things about the farm and home, are contained in over 500 Farmers' Bulletins, which can be obtained upon application to the Division of Publications, United States Department of Agriculture, Washington, D. C.



